DOCUMENT RESUME

ED 179 155 HE 011 981

AUTHOR	Hereford, Susan M.; Stice, James E.
TITLE	The Development and Evaluation of a Graduate Course in College Teaching: A Project Report. Research Bulletin.
INSTITUTION	Texas Univ., Austin. Measurement and Evaluation Center.
SPONS AGENCY	Moody Foundation, Galveston, Tex.
REPORT NO	RB-74-2
PUB DATE	Jan 74
NOTE	81p.; For related document, see HE 011 980
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	*Course Descriptions; *Course Evaluation; Course Objectives; Curriculum Development; *Engineering Education; Graduate Study; Higher Education; Instructional Media; Measurement Instruments; Microteaching; Orientation; *Preservice Education; Schedule Modules; Science Teachers; Student Characteristics; *Teacher Education; *Teaching Methods; Teaching Programs; Teaching Skills
IDENTIFIERS	*University of Texas Austin

ABSTRACT

A project was undertaken at the University of Texas at Austin to underwrite expenses incurred with the planning and implementation of a curriculum for developing teaching skills among students interested in teaching science and engineering. In this project report information is provided on the following: course goals and activities, course schedule, characteristics of program participants, and an evaluation of the impact of the project. The following materials are appended: orientation handout, summer 1973; handouts on educational objectives; microteaching instructions; references on the personalized system of instruction; report on audiotutorial systems conference; prepublication information about Sheffiels's book; information of student attitudes and characteristics; data on types of higher educational institutions; references on faculty unions and tenure; and student evaluation form. (SW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED179155

THE DEVELOPMENT AND EVALUATION OF A GRADUATE COURSE IN COLLEGE TEACHING: A PROJECT REPORT

Susan M. Hereford and James E. Stice

RB-74-2 January 1974

This report summarizes a project undertaken at The University of Texas at Austin with support from the Moody Foundation of Galveston, Texas, by a grant to the Bureau of Engineering Teaching. It covers the period from September 1972 through August 1973.

HE 011 981

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Measurement & Eval. Center, Univ. of Texas, Austin

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

MEASUREMENT AND EVALUATION CENTER
The University of Texas at Austin

PROJECT REPORT

The Development and Evaluation of a Graduate Course in College Teaching

by

Susan M. Hereford
Measurement and Evaluation Center

James E. Stice
Center for Teaching Effectiveness

The University of Texas at Austin

January, 1974

Project supported by Grant Number 72/48 from the
Moody Foundation of Galveston
to the
Bureau of Engineering Teaching
The University of Texas at Austin
(September 1, 1972, through August 31, 1973)

3/4

TABLE OF CONTENTS

Topic	Page
Grant Information	1
Historical Information	3
Course Goals and Activities	5
Course Schedule	9
Characteristics of Participants in the Program	12
Evaluation of the Impact of the Project	19
Conclusions and Future Plans	25
Financial Statement	26
References	27
Appendices	
A. Orientation Handout (Summer 1973)	28
B. Handouts on Educational Objectives	32
C. Microteaching Instructions	38
D. The Personalized System of Instruction (PSI)	40
E. Report on Audiotutorial Systems Conference	42
F. Prepublication Information about Sheffield's Book	53
G. Student Attitudes and Characteristics	57
H. Types of Higher Educational Institutions	65
I. Faculty Unions; Tenure	72
J. Student Evaluation Form	74

GRANT INFORMATION

Moody Foundation Grant Number - 72/48

Amount of Grant - $14,270.00

Purpose of Grant - To underwrite expenses incurred with the planning and implementation of a curriculum for developing teaching skills among students interested in teaching science and engineering as outlined in Application of January 31, 1972.

Changes or deviations from original proposal:

1. The original aim of the project was to offer a section of the college teaching course during Fall 1972, Spring 1973 and Summer 1973. During the life of the project we were to enroll 50 graduate students in engineering and the natural sciences.

   As it turned out, the number of students was smaller than intended, and several were from disciplines other than engineering and science. Poor communication was mainly responsible for the lower-than-desired enrollment in the course. Before the beginning of each semester, a letter was sent to each department chairman and each graduate adviser announcing the course, but only one student who enrolled had heard about it from his adviser. Individual letters sent to graduate students in engineering produced the best results.

   As it happened, it was a blessing that we didn't get 15 students per semester. We have concluded from our experience that the maximum class size is about 10-12 students per section for the course we have developed.
2. Of the salary proposed for James E. Stice, $5,417.00 was not spent, because the Department of Chemical Engineering didn't want it.
3. In Spring 1973 a graduate student assistant was hired to help with course activities, his salary being $1505.52.
4. A print of Robert Mager's film, "Who Did What to Whom?" was purchased for $196.22 (including postage) for use in the portion of the course pertaining to principles of learning and motivation.

Date project was initiated - September 1, 1972.

Names and titles of staff persons involved in program -

1. Dr. Susan M. Hereford, Assistant Director, Measurement and Evaluation Center, The University of Texas at Austin, and
2. Dr. James E. Stice, Associate Professor, Chemical Engineering, and Director, Bureau of Engineering Teaching, The University of Texas at Austin.

HISTORICAL INFORMATION

During the period 1970-1972 the Bureau of Engineering Teaching, College of Engineering, The University of Texas at Austin, attempted to introduce a graduate-level course in college teaching. During this period the College was under the direction of two different deans, and the department chairmen advised both against this idea. At this time we were aware of five universities in the United States which offered such a course, these universities being Kansas State University (College of Education), University of Michigan (Psychology Department), Michigan State University (College of Education), Purdue University (Department of Psychology, see memo, next page) and West Virginia University (College of Education).

In November 1972, Dean of Engineering Earnest F. Gloyna approved the submission of a proposal to the President's Office, The University of Texas at Austin, requesting funds for teaching salaries to offer a pilot course in college teaching for engineering and natural science students in the Summer of 1972. On December 14, 1972, Vice-President Peter T. Flawn allocated $1800.00 from the Academic Development Fund for this purpose.

As the two teachers for the course began to make plans, they decided that one trial would not be sufficient to assess the impact of such a course. Accordingly, they prepared a proposal to the Moody Foundation of Galveston, Texas, to obtain funds to offer the course during Fall 1972, Spring 1973 and Summer 1973. On February 18, 1972, the Moody Foundation approved the proposal and awarded Grant No. 72/48 in the amount of $14,270.00.

The proposed program has been carried out, as detailed in the following pages. In addition to the activities included in the grant proposal, a class for college faculty members was given during Summer 1973, with good results.

monday memo

Published for the Faculty and Staff of Purdue University

Vol. 5, No. 11 November 22, 1971

COURSE TO HELP FACULTY, T.A.'S PLAN INSTRUCTION

The Psychology of College Teaching (PSY 695) will again be offered second semester by John F. Feldhusen, professor of education and psychology. Several other University faculty members will serve as resource consultants in the course. The basic goal of the course is to assist graduate students and faculty in designing courses of instruction. The major areas of concentration will be the following:

1. Goals and objectives of instruction
2. Psychological aspects of students which must be considered in designing instruction
3. Selecting media, materials, and methods and the design of instruction
4. Sequencing instruction
5. Developing individualized, mastery, and learner-controlled instruction
6. Evaluating outcomes of instruction
7. Evaluating the instructional system

Occasional visitors will not be welcome. The course is designed for those graduate students and faculty who have a serious interest and inclination to develop new methods and materials.

Enrollment will be limited to 20 participants. All enrollees should be working as instructors or assistants in courses of instruction. All will be expected to develop a unit of instruction.

Faculty who wish to participate will not be required to register. Graduate students and instructors may take the course for three credits.

For further information or to reserve a place in the class, call Professor Feldhusen at 749-2844.

U. SENATE HEARS STATUS OF FUNDS, PLAN FOR 'RETREAT'

"Higher education is operating in a new climate and is facing a period when there will be less support from all sources of funds," the Purdue University Senate was told in a meeting Monday, November 15.

Lytle J. Freehafer, vice president and treasurer, pointed out that commitments largely due to increases in operating expenses will use up increases in the operating budget granted by the General Assembly.

President Arthur G. Hansen announced that he is planning a "retreat" for Purdue administrators, deans, and faculty representatives on December 3 to discuss the mission of the University.

See Page 8--U. SENATE

COURSE GOALS AND ACTIVITIES

The course supported by the Moody Foundation was officially designated Chemical Engineering 384.51, College Teaching in Engineering and Science. Its major operational goal, which was never stated to any of the students, was to make them learner-centered rather than content-centered.

The set of course objectives developed for the pilot section and modified during subsequent course offerings was:

1. Students will give at least three "microteaching" presentations to their classmates, at least two of which will be videotaped for later critique by the course staff.
2. Students will give at least two class presentations in their discipline to an undergraduate class. They will make plans for these presentations with the professor who is in charge of the class, and the presentations will be videotaped for later critique by the course staff. They will also pass out evaluation sheets to the students in the classes to which their presentations were made, and these sheets will be collected for later study.
3. Students will complete a media project which should take them about 12 hours to complete. This project will involve production of visuals, audiotapes, videotapes, models or other materials to be used to teach concepts in a course they are teaching or would like to teach.
4. Student will demonstrate operation of:
   a. 35 mm slide projector
   b. 16 mm movie projector
   c. Slide filmstrip projector
   d. Overhead projector
   e. Opaque projector
5. Students will demonstrate preparation of:
   a. Overhead transparency using Thermofax
   b. Overhead transparency using diazo process
   c. Standard ditto using three colors
   d. Ditto using Thermofax machines
   e. Color lift

6. Students will write five acceptable cognitive objectives for a course they might teach, following the form presented by R. F. Mager in Preparing Instructional Objectives.
7. Students will read Bugelski, The Psychology of Learning Applied to Teaching, and will see three films on Behavior Theory in practice. After this exposure they should be able to define and give examples of:
   a. Positive reinforcement
   b. Negative reinforcement
   c. Punishment
   d. Extinction
   e. Operant and respondent conditioning
   f. Generalization
   g. Discrimination
   h. Secondary reinforcement
8. Students will be able to discuss the following:
   a. Normative grading
   b. Criterion grading
   c. Contract grading
   d. Pass-fail grading
   e. Mastery
9. Students will be able to discuss the general features of the following teaching techniques, giving main advantages and disadvantages of each:
   a. Programmed instruction
   b. Instructional television
   c. Computer-based instruction
   d. Personalized system of instruction (PSI)
   e. Laboratory instruction
   f. Discussion techniques
   g. Audiotutorial instruction
   h. Competency-based learning
   i. Lecture method
10. Students will be able to discuss the following topics in the area of educational measurement:
   a. Types of test items
   b. Reliability of tests
   c. Validity of tests
   d. Item writing
   e. Item analysis
   f. Standardized testing
   g. The prediction of academic achievement

11. Students will be able to discuss:
    a. Fringe benefits for college teachers
    b. Tenure regulations at The University of Texas at Austin
    c. The rise of faculty membership in teachers' unions
    d. Objections to hiring Ph.D.'s for teaching positions in community colleges
    e. Reward structure in higher education
    f. Evaluation of teaching
12. Students will be able to discuss the characteristics of different types of institutions of higher learning:
    a. Universities
    b. Colleges
    c. Community colleges
    d. Technical institutes
13. Students should be able to describe classroom behavior of undergraduate students and explain what might underlie this behavior:
    a. Four different cases for all students
    b. Two different cases for female students
14. Students should be able to discuss the following topics with respect to classroom design:
    a. Seating
    b. Choosing projector lenses
    c. Choosing projection screens
    d. Lighting levels
    e. Lettering on 35 mm slides, overhead transparencies

Following the original offering of the course in Summer 1972, some changes were made in these objectives. These were as follows:

1. Objective 7 - The students were pretty unanimous in objecting to reading Bugelski's book (326 pages of text), complaining that it told them more than they ever wanted to know about learning psychology. Accordingly, the text was changed to Keller, Learning: Reinforcement Theory (2nd ed.), which has 82 pages of text. In addition, a basic textbook, College Teaching: A Systematic Approach by Brown and Thornton (McGraw-Hill, 1971) was adopted.

2. Objectives 1 and 2 - student feedback indicated that they thought two presentations of one hour each were too much. They preferred adding another microteaching experience and reducing the two hour presentations to one. We reduced the hour-long presentations to one, and we added a student-presented, twenty-minute seminar on some instructional technique to the three microteaches, the seminar presentation being videotaped for later critique.

Grading - After the first course offering in Summer 1972, we switched to a contract grading system. Under this system a student receives a B for satisfactory completion of the three microteaches, the seminar presentation on a teaching technique, media lab exercises in equipment operation and media production, the instructional materials project, and the hour-long classroom presentation to undergraduate students. For an A, the students complete an optional project requiring 30-40 hours of their time, this project to be approved by the course faculty. No final exam is given. This grading system has been well received by the students.

COURSE SCHEDULE

The college teaching course requires a 75-minute period for most of the presentations/discussions. The periods during which movies are shown and discussed need 75 minutes if the discussion is to develop productively. So do the micro-teaching sessions – it takes about 20 minutes for a seven- to ten-minute micro-teach to be given and discussed by the class, more when the discussion becomes spirited. As a result the class can't do more than about three microteaches a day. Thus it takes three full days to do one microteaching exercise with 75 minute periods; it would require four to five days if the class met for 50 minute periods. The microteaching has also resulted in fixing the maximum number of students in the class at 10 or 12.

The Fall Semester normally has about 27 meetings of Tuesday-Thursday classes, which are the 75-minute classes. In the Spring Semester there are about 30 Tuesday-Thursday class meetings. In the Summer Session the class meets three times per week on Monday-Wednesday-Friday for 75 minutes, and the class meets for nine weeks, giving 27 class meetings.

On the following two pages a typical schedule of classes for a 27-day semester is given, indicating the topics covered and the order in which they are taken up. Various deadlines are also indicated.

The textbook for the course is Brown and Thornton's College Teaching: A Systematic Approach, 2nd ed., New York, McGraw-Hill (1971). Auxiliary texts include Keller's Learning: Reinforcement Theory and Mager's Preparing Instructional Objectives. These books can't begin to cover all the topics discussed in the course, and a number of handouts are provided to the students so they may prepare themselves for class discussions. Copies of the major handouts distributed to the students are included in the appendices.

CHEMICAL ENGINEERING 384: College Teaching in Engineering and Science

SCHEDULE OF CLASS MEETINGS

1st Day	Orientation: Overview of course requirements
2nd Day	Instructional objectives (read Mager's PREPARING INSTRUCTIONAL OBJECTIVES)
3rd Day	Completion of discussion of instructional objectives; discussion of other instructional elements (read Chapter 3 in Brown and Thornton, COLLEGE TEACHING: A SYSTEMATIC APPROACH)
4th Day	Microteaching I
5th Day	Microteaching I (continued)
6th Day	Finish Microteaching I; demonstration of videotape equipment and practice in its assembly and operation
7th Day	Microteaching II (videotaped)
8th Day	Microteaching II (videotaped, continued)
9th Day	Finish Microteaching II (videotaped); discussion of individual differences in learning
	DEADLINE FOR COMPLETION OF MEDIA EDUCATION CENTER COURSES: WRITTEN PLANS FOR INSTRUCTIONAL MATERIALS PROJECT DUE
10th Day	Basic principles of human learning and motivation (read Keller's LEARNING: REINFORCEMENT THEORY)
11th Day	Learning and motivation (continued)
12th Day	Learning and motivation (concluded)
13th Day	Grading: Issues and systems
	INSTRUCTIONAL MATERIALS PROJECT DUE
14th Day	Testing: Theory and construction; characteristics of tests (read Chapter 6 in Brown and Thornton)
	PLANS FOR OPTIONAL "A" PROJECT SHOULD HAVE BEEN COMPLETED
15th Day	Evaluation of teaching effectiveness (read Eble's RECOGNITION AND EVALUATION OF TEACHING)
16th Day	Keller's personalized system of instruction (PSI) (read Bureau of Engineering Teaching Bulletin No. 4 on the Keller Plan)
	WRITTEN PLANS FOR CLASSROOM TEACHING EXPERIENCE DUE

17th Day	Seminar presentations
18th Day	Seminar presentations (continued)
19th Day	Seminar presentations (concluded)
20th Day	Summary of teaching methods (read Chapter 4 in Brown and Thornton)
	CLASSROOM TEACHING SHOULD HAVE BEEN COMPLETED
21st Day	Student characteristics (read Chapter 1 in Brown and Thornton)
22nd Day	Student characteristics (concluded)
23rd Day	Microteaching III (videotaped)
24th Day	Microteaching III (videotaped, continued)
	OPTIONAL "A" PROJECTS DUE
25th Day	Microteaching III (videotaped, concluded)
26th Day	Teaching environments and facilities (read Chapter 5 in Brown and Thornton)
27th Day	Professional issues in higher education; course evaluation

CHARACTERISTICS OF PARTICIPANTS IN THE PROGRAM

As of August 31, 1973, the date of expiration of the grant, 42 persons had participated in the project. Thirty-two students had fulfilled the requirements of Chemical Engineering 384.51, College Teaching in Engineering and Science. Thirty students had completed the course for credit. The other two students took part in all activities but were officially regarded as auditing the course. In addition, 10 members of The University of Texas at Austin faculty had participated in a parallel teaching effectiveness group conducted by Drs. Stice and Hereford during the Summer Session 1973.

Student Characteristics. Tables 1-4 present pertinent information about the 32 students who completed the requirements of the course in college teaching. Data in the area of student characteristics were collected each semester by scheduling an interview for each student with both instructors. Such interviews not only provided background information but also facilitated the rapid development of an open and responsive interpersonal atmosphere in the classroom. Such an atmosphere was essential for such class activities as microteaching and role-playing.

It can be seen in Table 1 that the students who completed the course requirements represented a wide range of graduate majors. In accordance with the originally stated purpose of the grant proposal, preference in enrollment was given to graduate students in the Colleges of Engineering and Natural Sciences. To facilitate dissemination of information about the availability of this new course, notices were initially sent to all department chairmen and graduate advisers in the Colleges of Engineering and Natural Sciences. Subsequently, notices were sent directly to graduate students in various areas of engineering. The channels of communication within the University proved to be slow and cumbersome, and by the time most interested graduate students in the two target colleges had received information about the new course, they had already made their academic plans for the year. Since this was the case, graduate students from other colleges and schools within the University were accepted into the course. It was the consensus of the instructors and most of the students that the diversity of student backgrounds was a very positive factor contributing to the success of the course.

Table 2 indicates that most of the students who took the course had had one or more types of teaching and related experience. Only one of the 32 reported no experience of any of the types categorized in Table 2. Most reported more than one type. It should be noted that the distribution of teaching fields is not identical to the distribution of graduate majors. For example, the student from Educational Psychology taught Hebrew, while the two students from Curriculum and Instruction taught in areas of Home Economics.

Tables 3 and 4 indicate the academic status of the 32 students at the time they took the course, with Table 3 indicating degrees in progress and Table 4 indicating highest degree completed.

In addition to academic background and experience, students were interviewed regarding previous courses in education, psychology or related areas and previous experience with educational media, as well as professional goals and motivation for taking the course.

While most (N=24) of the 32 students had completed no undergraduate education courses, six were certified as public school teachers in various subject matter areas. The remaining two had each taken one undergraduate education course. The range in extent of previous coursework in psychology was greater than that in education. While 13 reported no coursework in psychology, one was a doctoral candidate in educational psychology, one had a graduate minor in educational psychology, and two reported undergraduate minors in psychology. Of the remaining 15, nine had completed introductory psychology plus one undergraduate psychology elective (e.g., developmental, personality, etc.), and six had completed introductory psychology only.

Students were asked about prior experience with such educational media as projectors, transparencies, slides, and videotape equipment. Nine reported no experience at all, while 17 stated that they had limited experience with some media, usually dittomasters and 16 mm projectors. Only six of the 32 had had extensive experience with educational media prior to taking the course, and in most of these six instances, the experience had been limited to extensive utilization of only one or two media. Only seven had any prior experience viewing themselves on videotape.

With regard to professional goals after graduation, 23 students stated that they would like to find a teaching appointment immediately after graduation. Eight preferred to work in industry for a few years prior to beginning to teach. One

student was undecided about his goals. Almost all students intended to combine their teaching with some other form of practice of their profession. When asked about the type of academic setting in which they would prefer to teach, 16 chose a university setting, two preferred small liberal arts colleges, seven chose junior or community colleges, one preferred the high school level, and six had not yet developed preferences.

Only two of the 32 students reported having been motivated to take the course because of negative experiences with teaching in the past. Most students either had made a definite decision to teach and desired to learn more about it or were exploring the personal suitability of college teaching as a profession. Several foreign students were taking the course in order to enhance the skills with which they would return to teach in universities in their respective countries. The countries represented included Brazil, Iran, Israel, Mexico, Panama and Venezuela.

The Faculty Group. During the Summer Session 1973, a parallel section of the course in college teaching was offered for members of the faculty of The University of Texas at Austin. The first 10 of 31 applicants were accepted.

Table 5 presents a summary of the academic and professional disciplines represented by participants in the faculty group. This group met three times a week for nine weeks and participated in most of the same activities as the student group. Faculty participants engaged in microteaching and videotape playback sessions, as well as discussions of various teaching methods, grading systems, issues in higher education and principles of human learning and motivation.

Although it was not included as part of the original grant proposal, the faculty group seemed to be an ideal means of at least partially bridging the gap between the proposed number of students (N = 50) and the actual number of students (N =32), as well as beginning to design a badly needed approach to faculty development. The addition of the faculty teaching effectiveness group to other grant-related activities accomplished far more than merely increasing the number of participants to within eight of the target number. Because of the diversity of disciplines represented, the members of the faculty group have had a marked impact on the speed of dissemination of information regarding college teaching courses for graduate students as well as for faculty. Several have expressed an interest in establishing similar courses in their colleges and departments. Furthermore, the faculty group itself is currently regarded as a prototype for future similar faculty development activities being planned at The University of Texas at Austin.

Table 1

Distribution of Graduate Majors
Represented by Students in Course
on College Teaching

Graduate Major	Number of Students	
College of Business Administration		
Management	1	
Marketing Administration	1	
		2
School of Communication		
Speech Communication	2	
		2
College of Education		
Curriculum and Instruction	2	
Educational Psychology	1	
Science Education		
Chemistry	1	
Physics	1	
Physics and Biomedical Engineering	1	
		6
College of Engineering		
Aerospace Engineering	2	
Chemical Engineering	4	
Civil Engineering		
Architectural Engineering	2	
Environmental Health Engineering	1	
Structures	1	
Electrical Engineering	3	
Mechanical Engineering		
Biomedical Engineering	1	
Nuclear Engineering	2	
Operations Research	2	
		18
College of Natural Sciences		
Astronomy	1	
Chemistry	1	
Microbiology	1	
Physics	1	
		4
Total		32

Table 2

Distribution of Students' Teaching and Related Experiences Prior to or Concurrent with College Teaching Course

Type of Experience	*Number of Students	
College Level Classroom Instruction		
Chemical Engineering	1	
Chemistry	2	
Child Development (Home Economics)	1	
Electrical Engineering	1	
Hebrew	1	
Management	1	
Mathematics	1	
Physics	1	
Speech	2	
Statistics (Marketing)	1	
Textiles (Home Economics)	1	
		13
College Level Laboratory Instruction		
Architectural Engineering	1	
Biology	1	
Chemical Engineering	1	
Chemistry	2	
Electrical Engineering	2	
Physics	2	
		9
Other College Level Experiences related to Instruction		
Grading	9	
Tutoring	5	
		14
Public School Classroom Instruction		
Secondary	7	
Elementary	1	
		8
Other Teaching Experience		
Armed Forces	3	
Peace Corps	1	
		4

*Since many students reported experiences which fit into more than one category, summation of frequencies across categories is not meaningful.

Table 3
Distribution of Students in Terms
of Degree in Progress at Time
of Participation in College Teaching Course

Degree	Number of Students
Bachelor's (special permission to take course)	1
Master's	13
Doctorate	14
None (Post-Doctoral)	2
None (Special Students)	2
Total	32

Table 4
Distribution of Students in Terms
of Highest Degree Completed
at Time of Participation
in College Teaching Course

Highest Degree Completed	Number of Students
None (special permission to take course)	1
Bachelor's	19
Master's	10
Doctorate	2
Total	32

Table 5

Distribution of Academic and Professional Disciplines Represented by Participants in Additional Teaching Effectiveness Group for Faculty Members: Summer Session 1973

Academic and Professional Disciplines	Number of Faculty Participants
Aerospace Engineering	1
Architectural Engineering	1
Architecture	1
Classics	1
English	2
Management	2
Pharmacy	1
Speech Communication	1
Total	10

EVALUATION OF THE IMPACT OF THE PROJECT

At the last class meeting each semester, students were given a course evaluation questionnaire to complete and return. A copy of the evaluation instrument is included in Appendix J. An open-ended format was chosen for the instrument in order to encourage comments and recommendations from the students which would suggest directions for future course development. While the responses to the instrument are not validly quantifiable, they have been quite valuable in course development and have provided an index of the impact of the project as perceived by the students. Of the 32 graduate students who participated in the project, 24 returned their evaluation forms. Since two of the 32 were auditing the course, this represents a return rate of 80%, based on the number of students completing the course for credit.

The compilation of the data from the evaluation questionnaires was accomplished by reading all students' responses to each successive item and recording the number of positive, negative and neutral responses where appropriate. In addition, student reactions to the conduct of the course were recorded, along with spontaneous comments about the impact of various aspects of the course. An attempt has been made to prepare brief summaries assessing the impact of major aspects of the course.

In general, student response to the course was overwhelmingly favorable. It seems justifiable to state that, to varying degrees, all students felt that the experience was valuable and that none regretted having taken the course. Within this general positive evaluative context, certain aspects of the course were regarded more positively than others, as will be apparent in the following summaries.

Microteaching Experiences. Microteaching was rated favorably by all students responding to the questionnaire. Students valued the immediate feedback from their peers as well as the opportunity to practice speaking before a group. The fact that successful microteaching forces careful attention to timing and explication of objectives was frequently mentioned as a major positive aspect. There was some indication that students needed more orientation to the technique before attempting to participate in it. Several stated that they would have appreciated more intensive criticism of their presentations and wished that students and instructors would have been less reluctant to

state negative opinions. Student response was uniformly positive with regard to the impact of microteaching regardless of the extent of prior teaching experience.

Classroom Teaching Experience. Nineteen of the 24 student comments regarding the classroom teaching experience were favorable. The negative comments came largely from students who had more prior teaching experience relative to their peers. Most students perceived the classroom teaching experience as a realistic sample of classroom teaching, although several mentioned that one appearance before a class may be more analogous to giving a guest lecture than to teaching. Furthermore, some students commented that teaching a class for only one period allows no sense of continuity with class progress. Some students reported difficulty in making the arrangements for this assignment, and many stressed the enormous amount of required preparation time. Despite these difficulties, most students felt that the classroom teaching experience was an important and valuable portion of the course. Negative feedback from some students having relatively more prior teaching experience suggests that the classroom teaching assignment could be better administered on an individualized basis. Furthermore, instructors need to develop a more systematic means for assisting students in making arrangments for this assignment.

Videotape Feedback Sessions. The impact of the videotape feedback sessions was assessed favorably by 22 respondents. The other two responses were not really negative but instead seemed to reflect a lack of congruence between actual gains and the students' extremely high expectations of gains. Several students suggested group feedback sessions and indicated, as they had regarding microteaching, that they would have appreciated more negative criticism. There was apparently a feeling among many students that feedback, in order to be valuable, must be negative. In the opinion of the evaluator, this is a feeling which could be at least partially corrected in future offerings of the course by a guided group discussion on the nature of feedback. Students valued the opportunity to observe their mannerisms, teaching styles and expressions. Many stated that they would have appreciated even more videotape feedback sessions than were included, although most realized that more sessions might not be feasible.

Class Discussions. Eighteen of the 24 student evaluations of the class discussions were distinctly positive. The students, for the most part, perceived the classroom atmosphere as being conducive to open and meaningful discussions. The discussions served not only as a vehicle for presenting new information but also as an occasion for examining differing philosophies of education and attitudes toward students. The

lack of structure which characterized many of the discussions apparently disturbed a few students. Several commented that the discussions were frequently dominated by only one or two group members and that the focus of a particular session was often lost as a result. It should be noted that complaints such as these became less frequent during each successive semester as the instructors became more adept at guiding and focusing discussions without stifling the group's self-direction. For most of the students, this course represented a first experience with an open discussion format in an academic context. Even though student response to the discussions was for the most part very positive, it seems likely that it could be made even more positive by moving the consideration of the discussion method of teaching to an earlier point in the sequence of topics.

Media Courses. Fifteen of the 24 respondents reacted favorably to the short courses in media production and equipment operation. The consensus was that the skills acquired in these courses would be valuable in teaching. Several students with relatively more experience in dealing with media reacted negatively because they perceived the courses as being too elementary. As in the case of the classroom teaching assignment, the area of media education could be better administered on an individualized basis, thus providing more advanced and specialized experiences for students already possessing basic skills. There were also several complaints about the facilities available for the media courses. A few students dislike the inconvenience of having to go to a College of Education facility during specified hours. Ideally, facilities for media education should be more centrally located and better equipped. Until such facilities become available, however, those which exist must be utilized. All students realized the importance of a media component in a course on college teaching. The negative reactions were with regard to the quality of existing facilities. Until a central media education facility is available, it may be possible to design some instructional modules to supplement existing media resources for students in the course on college teaching.

Reading Materials and Films. College Teaching: A Systematic Approach by Brown and Thornton (McGraw-Hill, 1971) was seen as a good reference book by most students. Many considered it somewhat tedious to read but felt it was adequate as a basic text. Keller's Learning: Reinforcement Theory (Random House 1969) received favorable ratings from most students. Two described it as "nonessential." The consensus of most students and the instructors was that Keller's book, combined with three behavior theory films and Mager's film "Who Did What to Whom?", provided a com-

prehensive and interesting survey of major principles of human learning and motivation. Surprisingly, only two students reacted negatively to the predominance of examples from animal learning studies both in Keller's book and in the behavior theory films. The articles xeroxed from the Chronicle of Higher Education and other sources were well received by the students. Several commented that Mager's Preparing Instructional Objectives (Fearon Publishers, 1962) should be an additional textbook.

Student-led Seminars on Instructional Methods. Most students considered the seminars on instructional methods to be an efficient means of surveying various approaches to teaching. In general, they seemed to learn not only from the presentations of others but also from the process of searching the educational literature in preparation for their own presentations. Several students complained that many of the presentations seemed to lack depth and that they had difficulty taking notes which would aid them in future study. These problems could be remedied by giving the students more guidance and assistance in becoming familiar with educational reference sources, by setting higher standards of quality required for acceptable presentations, and by requiring each student to prepare for distribution an outline of his seminar as well as an annotated bibliography.

Student Reactions to Other Aspects of the Course. Student evaluations of the grading system used in the course, the clarity of course requirements, and the fairness of the demands which the course made on student time all were highly favorable. After experience with the pilot section of the course during the Summer Session 1972, the instructors instituted a contract system of grading. This contract system was perceived by the students as being the most equitable and reasonable grading approach for a course of this type. Several students suggested that the instructors should require more rigid compliance with deadlines within the contract system and should set higher standards for acceptability of media projects and seminar presentations. Apparently, the adoption of the contract grading system contributed to clarification of course requirements since all students taking the course after the institution of the contract system stated that the course requirements had been clear to them. With regard to students' perceptions of the extent to which the course placed excessive demands on their time, only one student stated that time demands had seemed too great. Several others commented that they had spent more time on the course than they had planned or more than was required, but that they had done so solely out of interest in the subject.

Student Suggestions for Additional Topics and Course Activities. Most students apparently felt that there would be no time available within the course structure to add either new topics or additional activities. Some suggested a more detailed treatment of

topics presently covered in the course. These suggested areas of expanded coverage included the psychology of learning and motivation, the evaluation of effective teaching, types of institutions of higher learning, and considerations in classroom design. New additional topics suggested by students included higher education administration, the preparation of credentials for applying for academic positions, continuing education for college teachers, counseling and referral services for students, and various philosophies of education. The students suggested such additional course activities as field trips to other institutions, tours of local campus facilities and projects, and visits to classes taught by instructors having the reputation of being effective teachers. Several students also suggested that guest speakers from this campus and other locations be invited to meet informally with the class.

Students' Perceptions of and Concerns about Teaching. It was stated in an earlier section of this report that an underlying objective of many activities in the course on college teaching was to make the students "learner-centered rather than content-centered." In an effort to obtain an indirect estimate of the extent to which this shift in orientation had occurred, students were asked at the end of the course to explain how, if at all, the course had affected their perceptions of teaching and to tell what aspects of teaching were of greatest concern to them.

Most of the responses pertaining to perception of teaching reflected an increased awareness of the complexities of human motivation and relationships. Several stressed their enhanced awareness of the impact of teachers on students' personal lives. Some students also reported an increased understanding of the problems facing the college teaching profession. While some of the students' responses reflected self-directed thinking (e.g., seeing the need for personal improvement in mannerisms, etc.), the majority were indicative of the kind of interpersonal sensitivity and awareness of the personal importance of teaching which was encouraged throughout the course. Similarly, the concerns about teaching which were expressed by the students were, for the most part, learner-centered. Concerns about arousing the interest of the learner, developing and maintaining rapport with the students, making learning useful and meaningful, and finding fair methods for evaluating students' work were some of the concerns most frequently expressed. Another concern mentioned by several students was apprehension about entering a profession with a reward structure which does not always reinforce dedication to teaching. Concerns such as this last probably should be dealt with in a more systematic manner in future offerings of the course. In summary, both the expressed concerns about teaching and the students'

statements regarding the impact of the course on their perceptions of teaching were, on the whole, indicative of the success of the project. Although each student began at a different point in his development, each seemed to make definite progress in the transition from being concerned about the personal impression he made in his teaching to being concerned about the impact his teaching had on students in affective as well as cognitive areas.

CONCLUSION AND FUTURE PLANS

The preceding discussion of student reactions to the course in college teaching which was developed largely as a result of the grant from the Moody Foundation indicated the success of the project. Plans for follow-up evaluation which were mentioned in the proposal have proven to be overly ambitious or premature—perhaps both. Many students who participated in the course are still attending the University and have not yet started their teaching careers. Several who have graduated are currently working in industrial or research positions. An unsolicited letter from one former student who is currently teaching, however, included the following statement: "In retrospect, participating in the course was the most important and contributing preparation for college teaching that I could have experienced." In the interest of future course development, a follow-up effort is still planned. However, given the level of maturity characteristic of most of the students who have thus far completed the course, it seems quite doubtful that their retrospective evaluations of the impact of the course would be very much different from the evaluation data previously reported.

In summary, the course in college teaching which was proposed has been developed and refined. Its impact has been quite favorably evaluated by the participants. The graduate course has been successful enough to be made a regular course offering in the College of Engineering, and it will be taught at least once each year. In addition to the development of the course in college teaching for graduate students, a teaching effectiveness group for faculty members was initiated. At the present time, there is much interest in continuing the development of similar groups for faculty members. News of the success of the course in college teaching developed in the College of Engineering has stimulated other colleges and departments at The University of Texas at Austin and other institutions to undertake similar endeavors. Despite the fact that fewer persons participated in the project than had been intended, the impact of the project has far exceeded our expectations.

BUDGET

AMOUNT OF MOODY FOUNDATION GRANT		**$14,270.00**
EXPENSES		
Salaries:		
Susan M. Hereford, Fall 1972	$1,922.81	
Susan M. Hereford, Spring 1973	1,922.81	
Kenneth Armstrong, Spring 1973	1,505.52	
Susan M. Hereford, Summer 1973	1,923.00	
James E. Stice, Summer 1973	2,808.00	
	$10,082.14	
State Treasurer's charge on salaries (employer's portion of social security, workmen's compensation insurance)	414.44	
Unemployment compensation insurance	82.12	
	$496.56	
Materials:		
6 reels ½-inch videotape	$112.50	
16 mm film, "Who Did What to Whom?"	196.22	
Duplication of Course Announcements	38.64	
Xerox charges	23.90	
	$371.26	
TOTAL EXPENDITURES		**$10,949.96**
Unexpended Balance		3,320.04

REFERENCES

Bloom, B. S. (Ed.). Taxonomy of educational objectives, handbook I: Cognitive domain. New York: David McKay Co., Inc., 1956

Brown, J. W., & Thornton, T. College teaching: A systematic approach. New York: McGraw-Hill, 1971.

Bugelski, B. R. The psychology of learning applied to teaching (2nd ed.). Indianapolis: Bobbs-Merrill, 1971.

Eble, K. E. The recognition and evaluation of teaching. Washington, D.C.: The American Association of University Professors, 1971.

Mager, R. F. Preparing instructional objectives. Belmont, Cal.: Fearon Publishers, Inc., 1962.

Mager, R. F. (Producer). Who Did What to Whom? Palo Alto, Cal.: Stanford University and Mager & Associates, Inc., 1972. (Film)

Keller, F. S. Learning: Reinforcement theory (2nd ed.). New York: Random House, 1969.

Sheffield, E. F. (Ed.). Teaching in the universities: No one way. Montreal: McGill-Queen's University Press, 1973.

Appendix A

Orientation Handout (Summer 1973)

ChE 384
Summer, 1973

COLLEGE TEACHING IN ENGINEERING AND SCIENCE

Through our mutual involvement and participation, this course will evolve throughout the term in accord with the needs and interests of class members. It is intended that the course be primarily experiential and that it be individualized as much as possible. This orientation handout has been prepared in order to give you a brief outline of the content areas to be surveyed and some of the activities and projects in which you will be involved.

The content areas below will be taken up in approximately the order listed. You will receive reading assignments, supplemental reading lists, reprints, and detailed outlines or instructions (where appropriate) for each topic as we come to it.

I. Educational Objectives
II. Basic Principles of Human Learning and Motivation
III. Survey and Analysis of Teaching Methods
IV. Educational Technology and Media
V. Measurement and Evaluation; Standardized and Classroom Testing; Grading
VI. Design of the Learning Environment
VII. Student and Campus Characteristics
VIII. The Academic Environment; Professional Issues in Higher Education

***

The projects and activities which will complement the course content are designed to give you experience in classroom teaching and in the preparation and use of instructional materials:

1. Microteaching: Several times during the term, you will be asked to prepare and teach a brief lesson to your colleagues. The microteaching sessions will have varying purposes, and you will receive complete instructions prior to each experience. Some of your microteaching will be videotaped for the purpose of subsequent feedback and discussion.

2. Each student will take two short courses in Media Education Laboratory (222 Woolridge Hall). The first course deals with equipment (omit the record player), while the second

deals with media production (omit dry mount and lamination, if desired).

Deadline: The completed checkout sheets for both equipment and media production must be turned in to the instructor by class time on June 22.

3. Preparation of Instructional Materials: Another major project will involve the preparation of a set of materials designed to facilitate the learning of an important concept, technique, or theory in your own discipline. This may take any one of many forms--a slide series, a set of transparencies, a film, a unit of materials (PSI), etc. It is intended that the product of this project will be useful to you in a course which you now teach or may teach in the future.

Deadline: You must advise the instructor in writing about your completed plans for preparation of these materials by June 22. The finished project must be handed in by class meeting on July 2.

4. Classroom Teaching: Each student will also make an actual classroom presentation during the term. In order to accomplish this, it will be necessary for you to make arrangements with an instructor in your own discipline to teach a period of one of his undergraduate courses. Hopefully, you will be able to work on a course which you would be likely to teach at some future time. This presentation will be videotaped for later discussion.

Deadline: You must advise the instructor in writing about your completed arrangements for this assignment by class meeting on July 9. The classroom presentation must be given by July 20.

5. Beginning about July 11 each class member will give a 30-minute in-class seminar dealing with educational methods and related topics. Further details on this requirement will be provided by June 20.

***

Grading

There will be no final examination in this course. Satisfactory participation in announced class activities plus satisfactory completion of the five requirements listed above (microteaching, Media Education Lab, preparation of instructional materials, classroom teaching and seminar presentation) will result in a grade of B.

If you wish to earn an A, you may complete an optional, additional project, to be planned in individual consultation with the instructional staff. If you intend to do the optional project, your choice of topic or activity should be agreed upon by July 5. The project is due on July 30.

INSTRUCTIONAL STAFF

Dr. James E. Stice
Taylor Hall #173
471-5953

Dr. Susan M. Hereford
Measurement and Evaluation Center
2616 Wichita St., Room 206
(The Bridgeway)
471-3032

Ten copies of the following books are on Reserve in the Engineering Library:

Mager, Robert F., Preparing Instructional Objectives, Belmont, California, Fearon Publishers, 1962.

Eble, Kenneth E., The Recognition and Evaluation of Teaching, Washington, D. C., The American Association of University Professors, 1971.

Bloom, Benjamin S. (ed.), Taxonomy of Educational Objectives, Handbook I: Cognitive Domain, New York, David McKay Co., Inc., 1956.

SUMMER HOURS

MEDIA EDUCATION CENTER

Monday	9:00 a.m. - 1:00 p.m. and 3:00 p.m. - 5:00 p.m.
	7:00 p.m. - 9:00 p.m.
Tuesday	9:00 a.m. - 5:00 p.m.
Wednesday	9:00 a.m. - 5:00 p.m.
Thursday	9:00 a.m. - 5:00 p.m.
	7:00 p.m. - 9:00 p.m.
Friday	9:00 a.m. - 5:00 p.m.
Saturday	10:00 a.m. - 1:00 p.m.

Appendix B

Handouts on Educational Objectives

USING THE TAXONOMY OF EDUCATIONAL OBJECTIVES

In the original project report sent to the Moody Foundation, Appendix B contained a reprint from the following book:

Gronlund, N. E. Stating objectives for classroom instruction. Chapter 4, "Using the taxonomy of educational objectives." New York: The Macmillan Company, 1970.

Taxonomy of Educational Objectives
Handbook I: Cognitive Domain
Benjamin S. Bloom, Editor

Abstract Prepared By
G.A. and M.S. Corser
June 1970

KNOWLEDGE

1.00 KNOWLEDGE - Knowledge is defined as the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting.

1.10 KNOWLEDGE OF SPECIFICS - The recall of specific and isolable bits of information.

1.11 KNOWLEDGE OF TERMINOLOGY - Knowledge of the referents for specific symbols.

1.12 KNOWLEDGE OF SPECIFIC FACTS - Knowledge of dates, events, persons, places, etc.

1.20 KNOWLEDGE OF WAYS AND MEANS OF DEALING WITH SPECIFICS - Knowledge of the ways of organizing, studying, judging, and criticizing.

1.21 KNOWLEDGE OF CONVENTIONS - Knowledge of the characteristic ways of treating and presenting ideas and phenomena.

1.22 KNOWLEDGE OF TRENDS AND SEQUENCES - Knowledge of the processes, directions, and movements of phenomena with respect to time.

1.23 KNOWLEDGE OF CLASSIFICATIONS AND CATEGORIES - Knowledge of the classes, sets, divisions, and arrangements which are regarded as fundamental for a given subject field, purpose, argument, or problem.

1.24 KNOWLEDGE OF CRITERIA - Knowledge of the criteria by which facts, principles, opinions, and conduct are tested or judged.

1.25 KNOWLEDGE OF METHODOLOGY - Knowledge of the methods of inquiry, techniques, and procedures employed in a particular subject field as well as those employed in investigating particular problems and phenomena.

1.30 KNOWLEDGE OF THE UNIVERSALS AND ABSTRACTIONS IN A FIELD - Knowledge of the major schemes and patterns by which phenomena and ideas are organized.

1.31 KNOWLEDGE OF PRINCIPLES AND GENERALIZATIONS - Knowledge of particular abstractions which summarize observations of phenomena.

1.32 KNOWLEDGE OF THEORIES AND STRUCTURES - Knowledge of the body of principles and generalizations together with their interrelations which present a clear and systematic view of a complex phenomena or field.

INTELLECTUAL ABILITIES AND SKILLS

2.00 COMPREHENSION - Understanding or apprehension such that the individual knows what is being communicated and can make use of it without necessarily relating it to other material.

2.10 TRANSLATION - Comprehension as evidenced by the care and accuracy with which the communication is paraphrased or rendered from one language or form of communication to another.

2.20 INTERPRETATION - The explanation or summarization of a communication.

2.30 EXTRAPOLATION - The extension of trends or tendencies beyond the given data.

3.00 APPLICATION - The use of abstractions in particular and concrete situations.

4.00 ANALYSIS - The breakdown of a communication into its constituent parts such that the relative hierarchy of ideas is made clear.

4.10 ANALYSIS OF ELEMENTS - Identification of the elements included in a communication.

4.20 ANALYSIS OF RELATIONSHIPS - The connections and interactions between elements and parts of a communication.

4.30 ANALYSIS OF ORGANIZATIONAL PRINCIPLES - The organization, systematic arrangement, and structure which hold the communication together.

5.00 SYNTHESIS - The putting together of elements and parts so as to form a whole.

5.10 PRODUCTION OF A UNIQUE COMMUNICATION - The development of a communication in which the writer or speaker attempts to convey ideas, feelings, and/or experiences to others.

5.20 PRODUCTION OF A PLAN OR PROPOSED SET OF OPERATIONS - The development of a plan of work or the proposal of a plan of operations which satisfy requirements of the task.

5.30 DERIVATION OF A SET OF ABSTRACT RELATIONS - The development of a set of abstract relations either to classify or explain particular data or phenomena, or the deduction of propositions and relations from a set of basic propositions or symbolic representations.

6.00 EVALUATION - Judgements about the value of material and methods for given purposes; qualitative and quantitative judgements about the extent to which material and methods satisfy criteria.

6.10 JUDGEMENTS IN TERMS OF INTERNAL EVIDENCE - Evaluation of the accuracy of a communication from such evidence as logical accuracy, consistency and other internal criteria.

6.20 JUDGEMENTS IN TERMS OF EXTERNAL CRITERIA - Evaluation of material with reference to selected or remembered criteria.

Taxonomy of Educational Objectives
Handbook II: Affective Domain
David R. Krathwohl et al.

Abstract Prepared By
G.A. and M.S. Corser
June 1970

ATTITUDES

1.0 RECEIVING - Willingness to attend to a phenomenon or stimuli.

1.1 AWARENESS - Consciousness of a situation, phenomena or object without an assessment of its qualities or nature.

1.2 WILLINGNESS TO RECEIVE - Willingness to tolerate a stimulus rather than avoid it.

1.3 CONTROLLED OR SELECTED ATTENTION - Differentiation of a given phenomenon from other phenomena still without assessment.

2.0 RESPONDING - Commitment or involvement in a subject, phenomena or activity that a learner seeks it out and gains satisfaction with it.

2.1 ACQUIESCENCE IN RESPONDING - Obedience or compliance without fully accepting the necessity for such behavior.

2.2 WILLINGNESS TO RESPOND - Voluntary compliance proceding from choice.

2.3 SATISFACTION IN RESPONSE - Emotional response, generally satisfaction, enjoyment, or zest, attached to the behavior.

3.0 VALUING - Internalization of a set of specified, ideal values or worth.

3.1 ACCEPTANCE OF A VALUE - Sufficient consistency and commitment to a value that a learner can be identified with it, but at a low level of certainty.

3.2 PREFERENCE FOR A VALUE - Sufficient commitment to a value to seek it out.

3.3 COMMITMENT - Commitment with a high degree of certainty and conviction resulting in activity seeking to further the thing valued.

4.0 ORGANIZATION - Ordering and interrelating the values into a system.

4.1 CONCEPTUALIZATION OF A VALUE - Abstraction of a value to relate it to one already held.

4.2 ORGANIZATION OF A VALUE SYSTEM - Ordering the values into an internally consistent system, most likely in dynamic equilibrium.

5.0 CHARACTERIZATION BY A VALUE OR VALUE COMPLEX - Evocation of behavior no no longer arouses emotion except when the individual is challenged or threatened.

5.1 GENERALIZED SET - Internal consistency of the system at an instant which enables an individual to reduce and order the complex world about him and to act consistently and effectively in it.

5.2 CHARACTERIZATION - A value system having as its object the whole of what is known or knowable involving great inclusiveness and internal consistency.

Taxonomy of Educational Objectives
Psycho-motor Domain
George A. and Maureen S. Corser

SKILLS

1.0 ACTION - A single conscious movement complete in itself and essentially unique; competence sufficient to perform a movement as directed.

2.0 OPERATION - Competence to apply or perform a sequence of actions in a prescribed manner.

3.0 COORDINATION - Collection of operations with more refined technique.

4.0 CRAFTSMANSHIP - Technical expertness in performance of a task independently (without supervision).

5.0 ARTISTRY - Technical expertness in performance which is internalized resulting in interpretive activity.

Appendix C

Mircoteaching Instructions

INSTRUCTIONS FOR FIRST MICROTEACHING EXPERIENCE

For your first microteaching experience, you should be prepared to teach a five to ten minute "lesson" to your colleagues.

Microteaching is a form of role-playing in which you assume the instructor role for a relatively brief period of time while the other class members play the role of your students.

Since ten minutes is the absolute time limit for your first lesson, you should be careful to limit the amount of material you plan to present. The topic of your lesson may be any elementary concept, process, etc. which you feel you can teach in the specified time period. It need not be from your own academic discipline. Many individuals, in fact, find they learn more about their own communication skills when they step outside their own field of specialization to choose a topic.

Regardless of the topic you choose, you should place yourself in the role of an instructor of undergraduates. It is vitally important to remember that when you are microteaching, you are playing roles. When you assume the instructor role, try not to view this activity as making a presentation to fellow graduate students. Similarly, when you assume the student role, remember that undergraduate students typically are not experts in the subject being taught.

This first microteaching experience is not intended to be any kind of major production. It is not expected that you should spend more than an hour or so preparing for it outside of class. It will not be videotaped. However, constructive feedback from the other class members following your presentation should facilitate an experientially based understanding of such critical instructional elements as clarification of objectives, determination of class readiness to learn, provision of motivation, and evaluation of student learning. Furthermore, this first microteaching experience should provice an occasion for examination of various concepts of teaching and for an introduction to role-playing procedures.

Appendix D

The Personalized System of Instruction (PSI)

THE PERSONALIZED SYSTEM OF INSTRUCTION (PSI): THE KELLER PLAN APPLIED IN ENGINEERING EDUCATION

In the original project report sent to the Moody Foundation, Appendix D contained the following publication:

Stice, J. E. (Ed.). The personalized system of instruction (PSI): The Keller Plan applied in engineering education. Austin: Bureau of Engineering Teaching, Bulletin No. 4, December 1971.

The Bulletin was comprised of the following articles, some of which had been published previously:

Keller, F. A. "Good-bye, Teacher . . .". The Journal of Applied Behavior Analysis, Spring 1968, 1, 79-89.

Keller, F. A. Neglected rewards in the educational process. Excerpt from an address published in Proceedings of the twenty-third annual meeting of the American Conference of Academic Deans, January 16, 1967, 9-22.

Koen, B. V. Self-paced instruction in engineering. Engineering Education, March 1970, 60 (7), 735-736.

Koen, B. V. Self-paced instruction in engineering: A case study. IEEE Transactions on Education, February 1971, E-14, 13-20.

Hoberock, L. L. Application of reinforcement learning theory in mechanical engineering.

Koen, B. V., & Keller, F. A. Experience with a proctorial system in instruction. Engineering Education, March 1971, 61 (6), 504-505.

Hoberock, L. L. Personalized instruction in mechanical engineering. Engineering Education, March 1971, 61 (6).

Wagner, G. R., & Motazed, B. H. The proctorial system of instruction combined with computer pedagogy for teaching statistics.

Hoberock, L. L., Koen, B. V., Roth, C. H., & Wagner, G. R. Theory of PSI evaluated for engineering. IEEE Transactions on Education, February 1972, E-15.

Appendix E

Report on Audiotutorial Systems Conference

REPORT ON AUDIO-TUTORIAL SYSTEMS CONFERENCE

PURDUE UNIVERSITY

October 20-21, 1969

Use of Audio-Tutorial Systems

First used in botany and biology but now used in virtually every discipline including history, English, sociology, engineering, nursing, and even pilot training (American Airlines).

Virtually all levels of education are using A-T Systems but it appears to be particularly popular in Junior Colleges and new Community Colleges.

Organization of A-T Systems

There is tremendous variation in the organization of A-T Systems. Many colleges and universities use a total A-T program with lectures, outside reading, laboratory and demonstrations combined into an individual study session (ISS). These courses usually also have a once-a-week general assembly session (GAS) and a once-a-week integrated quiz session (IQS), but do not have traditional lectures.

Other schools or courses use A-T for just part of their instruction, most often for the laboratory work, but the total A-T program appears to be the most common.

Most installations have open, unscheduled labs where students can come whenever and for as long as they choose. Students are given a list of behavior objectives that they are expected to achieve by the end of each A-T lesson. If they know them already, they can skip the lesson.

Evaluation of A-T Approach by Teachers Using System

Relatively few controlled evaluations of the A-T method have been done

and these have only compared A-T with lecture courses in the short-term recall of facts. (No other course objectives have been rigorously compared as yet.) Virtually all of the studies performed show no significant difference between A-T and standard lecture procedures in the short-term ability to recall facts.

However, the users of A-T teaching systems claim many qualitative advantages. These include:

Students enjoy the A-T course more.

Students like the open lab arrangement--can take as much time or as little time as they need.

Student can work at his own rate and skip material that he already knows. (Note: While trying 2 topics in Postlethwait's course I found it hard to skip part of a topic.)

Get more majors using A-T approach.

More interest in subject.

Less dependence on how good the laboratory instructor is. More students get good instruction instead of poor to very good.

May cost less in staff if expensive staff was used previously, but others reported no saving in staff. (This is because the A-T lab is usually kept open for extensive periods in open lab type arrangement, and the senior staff generally makes strenuous efforts to overcome lack of student contact with senior faculty by frequently visiting the A-T rooms for consultation. Also the preparation of tapes, study guides, demonstrations, etc., is very time comsuming.)

Student:Teacher Ratio is higher for some A-T systems but not for others.

Tape can provide opportunity to emphasize some things more.

Spoken word can color statements with interest that cannot be done with printed word in books and lab manuals.

Making tapes (and listening to the playback) forces self-evaluation by

the teacher.

A-T approach allows the student to test himself and to immediately evaluate success of learning.

All of the A-T users queried replied that they were happy that they tried A-T, all claimed that they would use it if they had it to do over again, but two stated that they had doubts about its use. The general comment was that A-T is not for everyone or for every course and that it requires much more work by the teacher than conventional methods. (In some cases teachers claimed that it took 100 hours per week of work by the teacher, and 60 to 80 hours was often cited. After the first year the amount of preparatory time decreases, but it still is very time consuming to revise tapes, set up materials, and keep in contact with the students.)

A number of A-T users pointed out that the A-T approach was not for everyone and that only people who were thoroughly committed should participate. If a group is involved in a course, all of them must be committed to it, because, "one 'anti' could ruin the whole thing." According to some, the A-T approach "requires the innovative, dynamic teacher."

Some Negative Aspects of A-T System Teaching Presented by Some of the Symposium Panelists

One panelist (Joe Rubinstein, a psychologist at Purdue) worried about the use of machines and the relative disregard of textbooks--"the best self-pacing device ever developed." He also felt that, "tapes were static compared with textbooks and developed mechanical skills and taxonomies instead of insight." Rubenstein pointed out several things that he felt were missing from the A-T approach.

1. Student doesn't get special insights into those problems without ready solutions.
2. No experience in group action and interaction among people to make decisions.
3. Little or no experience in inquiry approach.

Another panelist (Ernest McDaniel--Educational Research at Purdue) also deplored the lack of inquiry in A-T teaching and pointed out that the A-T student lacked experience in "problem sensing, problem finding and problem solving." He also cited Bruner as saying that any instruction should lead the student to the major organizational ideas of the discipline, and, in addition, the student should gain experience in the mode of inquiry of the discipline. McDaniel felt that A-T teaching was deficient in these goals. They rarely had to ask questions or cope with data.

A number of outside A-T speakers warned of sensing a kind of religious fervor on the part of A-T users and some even referred to making St. Samuel medals. Not all the A-T users sounded like "true-believers" but many did. One speaker, Arthur P. Coladarci of Stanford, warned A-T advocates that some of them were guilty of setting up straw man comparisons and that they were making self-fulfilling prophesies. He emphasized the Procrustean nature of their evaluations.

Rubenstein also commented that the A-T people were so concerned with the technique that they didn't worry enough about what gets put into the machines. (This worry seemed to be confirmed by my personal observations.)

Personal Evaluation of A-T Teaching

I went to the conference to learn how to best adapt A-T teaching techniques to our biology and/or botany courses. I had thought about using A-T teaching to permit me to offer several options of laboratory work on each topic so that

students with better backgrounds could work at a more advanced level or could use more sophisticated techniques or different organisms. Since I was proposing to set up such a system, I was fairly enthusiastic about the prospects. I came away with serious doubts about the desireability of a total A-T course, and wondered if there were enough advantages to warrant the expense of a partial A-T approach.

In my view the advantageous features of A-T teaching are:

1. It is especially good for descriptive materials. In biology this would include anatomy, morphology, ultrastructure, taxonomy, etc., where the student needs to observe specimens while the teacher describes it. Here the laboratory observation can be integrated with the teacher's description, and duplication in lecture and laboratory can be avoided. In history, this could include the examination of basic documents while the teacher discusses them.
2. The self-scheduling and self-pacing features of A-T are obviously advantageous to the student and the students liked them very much. The ability to back up and replay, as often as is necessary, those parts of the lesson that the student didn't get the first time is very desireable.
3. Taped instructions insure that all students get the same minimum (hopefully high) level of instruction and variations due to teaching assistants is minimized.
4. A-T system allows immediate self-testing and correction of errors by the student.
5. Student can skip units that he already knows. If he can meet the behavioral objectives before starting exercise he need only take the test on that topic.

6. A variety of topics or experiments could be made available to the student so that the student could make choices based on his background and interests. This potentiality was not being pursued by anyone at the conference--the objections being logistical and the time required to produce the tapes.

In my opinion the disadvantages of A-T teaching are:

1. A-T teaching does not permit the teacher to sense the student's response and to modify his teaching pace, number of repititions, and examples, as a consequence of the student's reaction.
2. A-T does not permit the student to immediately ask the primary teacher (presumably more experienced and knowledgeable) to explain points he does not understand. There is much less opportunity for the student to immediately challenge points with which he disagrees and for other points of view to be expressed in front of the entire class.
3. Preparing tapes and related materials is very time-consuming and apparently requires much more preparation than lecture and laboratory approach. Most of those present suggested that released time to prepare tapes was essential and that a lead time of 3-6 months, and preferably a year, was necessary.
4. The long lead time in preparation reduces the opportunity to incorporate current news items and to make the material relevant.
5. A-T teaching is not as suitable for:
   a. Developing abstract concepts
   b. Inquiry-type approach
   c. Dynamic processes
   d. Laboratory instructions--student needs to keep instructions before him.
   e. Teaching the student to collect and evaluate data and to draw his own

conclusions.

f. Asking questions of the student and expecting him to respond with ideas of his own.

g. Confronting the student with a set of facts and expecting him to develop questions, hypotheses and his own experiments to test the hypotheses.

6. The student is more passive than in the traditional lecture, laboratory, reading approach. No response from student is expected.

7. There is danger that once tapes are made they will not be brought up to date as often as is desireable. Lecture materials are easier to update than tapes.

8. Self-scheduling could result in less efficient use of available space and teaching assistant's time.

9. The student is less likely to have a permanent record of the course. To overcome this some teachers provide the student with the script, in some cases only on demand. Others allow the student to copy the tape with their own tape recorders.

10. The pace of the tapes was slower than a typical lecture and I found it soporific. Therefore the number of concepts that could be taught in an hour was much less than in a lecture. (Interestingly enough, some of the student complaint slips, which were posted, commented on the slow pace and one said that he played the tape at 7 1/2 inches per minute instead of the 1 7/8, and found it fine.) Since the student can readily stop and back-up (or go forward) on the tape, I don't see the reason for the slow pace, but several teachers commented that they found it necessary to slow down the reading of the script when they revised the tapes.

11. The argument that a student has to waste time in lectures when he already knows the material while with the A-T system he can skip it is not entirely justified. If the teacher gives the student a lecture schedule, he can also avoid those topics he already knows.
The retort that he comes anyway in the expectation of learning a few new facts would also apply to an A-T lesson. The statement that the A-T student could play just the parts of the lesson that were new, did not stand up in practice because the student could not know what parts were new without listening to the entire tape, and I found it very clumsy and time-consuming to try to skip parts that were familiar because you could not tell in advance where it ended.
12. One of the most disappointing features of the A-T system was that it really did not live up to its potential of individualizing instruction. The only individual aspect to A-T was in the time and scheduling area, the subject matter and level was still the same for all students. In addition, unlike true individualized instruction, they were expected to reach the same end-point in the course, regardless of their starting point.
13. A very serious shortcoming of A-T teaching is that it tends to chop a course up into a number of mini-courses (in fact Postlethwait calls his lessons mini-courses) and this results in a fragmented course with little coherence or interrelation of topics. The day I visited Postlethwait, the choice of lessons in his Botany course were: DNA Duplication and Protein Systhesis; Mineral Nutrition (of plants); and Respiration. At least one of these was the previous week's exercise.
14. Perhaps the most serious criticism of A-T learning is that the student uses learning techniques that are not applicable to the real world and gets little experience in learning the techniques appropriate to the

discipline. After leaving college, or in higher level courses, the student will generally get new information by listening to lectures, symposia and oral papers or by reading books and journals. It is unlikely that he will ever again get it by listening to a prepared, predigested tape.

First-Hand Observation of Purdue A-T Systems

I spent an afternoon with four A-T designed courses in biological subjects. I found that the system seemed to work best in a morphology course (combined plant and animal) where the student could hear instructions and descriptions while observing the plants. I was told that the professor in the animal part of the course did not like A-T and was not planning to use it.

In the beginning biology courses--a separate term of botany and a separate term of zoology--the subject matter was taught at a much lower level than in our beginning biology courses, and the lab demonstrations and exercises were particularly juvenile with no attempt to develop techniques, concepts, or even an understanding of why different experimental procedures were employed. The exercises were not inquiry oriented, did not ask questions, the students didn't do anything quantitative, and did not draw conclusions. They were hardly more than observational, and did not attempt to teach the scientific method.

The instructions were cook-book style and were not handed out but were on cards posted on the back drop of the demonstration table. i.e., "Step 1. Take three test tubes and put a dry corn grain in one, a germinated corn grain in the next and leave the third blank." Something like that.

I am sure that this is not an inherent limitation of the A-T method, but more sophisticated experiments would benefit from written instructions, that the student takes with him and studies in advance of the laboratory.

Furthermore, the concept of a variety of options in lab exercises could more readily be done by having several sets of printed laboratory instructions instead of several tapes.

Irwin Spear

Appendix F

Prepublication Information about Sheffield's Book

NOVA SCOTIA TECHNICAL COLLEGE
P. O. BOX 1000
HALIFAX, N. S.

CHEMICAL ENGINEERING

July 20, 1973

Dr. James E. Stice
Professor of Chemical Engineering
Director of the Bureau of Engineering Teaching
University of Texas at Austin
Texas, U. S. A.

Dear Dr. Stice,

You will remember that at the recent Effective Teaching Workshop at University of New Brunswick I mentioned a study on this topic being carried out by Professor Edward F. Sheffield at the University of Toronto in Ontario, Canada. At that time I indicated that the results of his survey would be published as a series of essays. Today I have received the pre-publication announcement of his book and since you expressed some interest in the survey I thought you may be interested in this volume as well. The announcement reads as follows:

TEACHING IN THE UNIVERSITIES
No One Way Edited by E. F. Sheffield

Publication Date: April 1974 ISBN 0-7735-0193-2
Price: To be announced

"Twenty-four professors, identified by former students as excellent teachers, present in this book highly personal accounts of their views and methods of teaching, five of which are in French. Though different in personality and approach, they share the conviction that the teacher's role is to stimulate the students to learn; each is enthusiastic about his field of study; most rely on the lecture to present their material; all work hard at teaching, spending much time in preparation. They believe students are important.

In addition to summarizing the views and practices of the teachers, the editor analyses the comments made by a thousand former students about these teachers. The ten most mentioned characteristics are: they are masters of

their subjects; they deliver well-prepared orderly lectures; they relate their subjects to life; they encourage students' questions and opinions; they are enthusiastic about their subjects; they are approachable, friendly, available; they are concerned for their students' progress and welfare; they have a sense of humor; they are warm, kind, sympathetic; they use teaching aids effectively. A surprising discovery is that graduates who studied in different fields at different times and under different conditions report similar patterns of effective teaching as they experienced it.

The editor concludes that effective teaching is more a matter of attitude (towards the student and subject) than method. He believes that the improvement of teaching in the universities would be encouraged if the system of rewards - rank, recognition and income - were altered so that it would compensate professors for devoting effort to teaching as well as to research and publication.

Edward F. Sheffield is Professor of Higher Education, University of Toronto."

The book will be published by McGill-Queen's University Press, 3458 Redpath Street, Montreal 109, Quebec. I know that any American inquiries should also be directed to that address but that books are shipped directly from their New York warehouse.

I was very impressed with the Workshop at U.N.B. and thought you did an excellent job. I have since had a lot of fun with the copies of your "number game" which I brought back and it has been the subject of some great discussion at times. I have not worked with groups of any size but if the opportunity presents itself I will control the test rigidly and send the results to see how they fit with your study which will probably be complete by that time. Perhaps you could send me a copy of the final paper from the experiment. It would be appreciated. In any case, I hope this book will be of some interest. All the best.

Yours truly,

Des Cousens.

Des Cousens.

TEACHING REALLY MATTERS, OR DOES IT?

In the original project report sent to the Moody Foundation, Appendix F also contained a reprint of the following article:

Taveggia, T. C., & Hedley, R. A. Teaching really matters, or does it? Engineering Education, March 1972, 62 (6), 546-549.

Appendix G

Student Attitudes and Characteristics

REPRINTS FROM THE CHRONICLE OF HIGHER EDUCATION

In the original project report sent to the Moody Foundation, Appendix G contained reprints of the following articles and/or tables from The Chronicle of Higher Education, 1717 Massachusetts Avenue, N.W., Washington, D.C.:

November 22, 1971:

33,000 graduate students' views dissect education and society, pp. 1;4.

Views of graduate students [table], p. 5.

Background characteristics of graduate students [table], p. 4.

January 11, 1971:

'Podunks' may benefit their students most, a survey indicated, pp. 1;3.

February 14, 1972:

Who drops out of college? A new study draws a profile, pp. 1;4.

9/21/71

THE ENGINEER: A PROFILE

Dr. Ed. Gilbert

....based upon a compilation of the psychological research intended to identify the personality characteristics of engineers.....

PART I. THE OVERALL PROFILE

Experimental research findings appear to suggest the following profile of engineers. These factors seem to be shared by undergraduate engineering students, graduate school engineering students, and professionally employed engineers. The profile is based upon samples composed mainly of electrical, mechanical, and industrial engineers with most studies including few, if any, aeronautical or chemical engineers.

(I) HIGH ACHIEVEMENT MOTIVATION

great involvement with work
striving for achievement
competitively seeks to excell in his work
believes success is attained through hard work
industrious

(2) HIGH NEED FOR ORDER

fondness for structure and order
integrates material well
aversion to ambiguity
efficient work habits

(3) LOW NEED FOR AFFILIATION

social participation based on conventionality and social conformity rather than any profound interest in people
avoids involvement and concern regarding the lives and affairs of others
seldom tells troubles to other people
somewhat uneasy about meeting new people

(4) LOW IN INTRACEPTION

avoidance of introspection
avoidance of self examination

(5) HIGH ENDURANCE MOTIVATION

energetic
goal directed
conscientious
persistent in problem solving activity
perseverance

(6) INTELLECTUAL CHARACTERISTICS

intellectually quick; exact
analytical in thought
confident in intellectual ability
thrives on challenging ideas and problems
high intellectual ability
filled with curiosity

(7) MISCELLANEOUS CHARACTERISTICS

not want to become involved in social or political problems

high sense of occupational responsibility
aspire to high levels of professional achievement

strong sense of family responsibility

religious beliefs and church activities occupy a relatively small part of an object-oriented personality

prefer objects and processes to people

perceive themselves as self sufficient

having had excellent educational training

highly self disciplined

possessing good mathematical skills, liking and enjoying mathematics, preferring hobbies requiring mathematical skills

possessing good mechanical skills, liking and enjoying mechanical skills, preferring hobbies requiring mechanical skills

highly masculine interests

PART II. SPECIFIC STUDIES AND THEIR FINDINGS

(1) "A Profile of the Mechanical Engineer"
Harrison et al
Personnel Psychology, 1955, p. 469-490

In addition to supporting the profile described in Part I, Harrison found mechanical engineers:

1. to rely heavily on authority for settling issues
2. to be decisive, tough-minded, direct, and straightforward in their thinking

(2) "Personal Characteristics of Engineers"
Carroll Izard
Journal of Applied Psychology, 1960, vol. 44, p. 332-335

In addition to supporting the profile described in Part I, Izard found engineers to be less willing to ask others for help, aid, or assistance when in need.

(3) "Psychological Concomitants and Determinants of Vocational Choice"
K. M. Kunert
Journal of Applied Psychology, 1969, vol. 53, p. 152-158

In addition to supporting the profile described in Part I, Kunert found graduate students in engineering schools in the San Francisco Bay Area to perceive themselves as:

1. having a preference for short stories and magazine articles rather than longer books and serious nonfiction
2. having little interest in abstract or aesthetic considerations
3. having a philosophy of "live and let live"

(4) "Interests of Engineers Related to Turnover, Selection, and Management"
J. B. Boyd
Journal of Applied Psychology, 1961, vol. 45, p. 143-149

1. High Achievement Engineers (those who had quickly progressed to senior status in their organizations) were likely to have
   (a) a high level of literary and artistic interests
   (b) considerable disliking for competitive and persuasive activities

2. Engineers with SHORT TENURE (left their public utility employer within 18 - 24 months) had higher vocational interest in the following vocations: lawyer, advertiser, real estate salesman, sales manager, life insurance salesman, carpenter, aviator, policeman, and farmer.

(5) "Factors in Occupational Image"
E. Marks and S. Webb
Journal of Applied Psychology, 1969, vol. 53, p. 292-300

In addition to supporting the profile described in Part I, Marks and Webb found the following three samples to all give these same profile characteristics of engineers (freshman college students who had listed electrical engineering as their major, seniors who were scheduled to graduate as electrical engineering majors, and professionals employed as electrical engineers).

All three groups felt the following to characterize engineers:

inquisitive
flexibility of thought
poor deductive reasoning
good inductive reasoning
adaptibility
ability to make appropriate judgments
lack of foresight
ingenuity
unreliable
exacting
resistant to change
inability to consistently meet deadlines
consistent performance at top ability
well read within profession
superior high school and college achievement

(6) "Life History Antecedents of Sales, Research, and General Engineering and Interest"
Chaney and Owens
Journal of Applied Psychology, 1964, vol. 48, p. 101-105

A. GENERAL ENGINEERING INTEREST (electrical, mechanical, and industrial engineers)

In addition to supporting the profile described in Part I, Chaney and Owens found, amongst this sample:

1. tendency to come from relatively larger high schools
2. history, economics, and civics to be the most difficult and the most disliked school subjects
3. enjoyment in courses requiring concrete problem solving
4. dislike for discussion courses
5. avoidance for situations requiring a high level of verbal skill
6. the exceptionally bright students within this group to come from upper-middle class homes in towns whose populations are between 5,000 and 25,000 people
7. the exceptionally bright students tended to have parents who were rather inactive socially
8. low frequency of dating
9. did not feel free to express their views to their professional associates
10. tended to have close friends
11. as professionals seek positions that will allow them to develop and use their own ideas
12. prefer research or design activities in small group situations which provide a minimum of interaction with others
13. derive most of their satisfaction from academic and professional success

B. RESEARCH ENGINEERS

1. fathers: not likely to be in sales or business occupations strict with their sons
2. like to work with ideas and experiment with new methods
3. unlikely to have participated in high school activities
4. like operas, symphonies, concerts
5. do not view themselves to be:
   (a) popular (b) self confident
6. consider professional status and authority to be important to themselves

C. SALES ENGINEERS

1. in general liked school
   disliked natural and biological sciences
   only average ability and achievement in mathematics and science courses

2. tend to come from exclusive sections of cities over 25,000 in population

3. characterize their fathers as:
   strict, moralistic
   employed in business, sales, or supervisory work
   giving them more freedom and money than their classmates

4. parents stressed the importance of a good education

5. early and more frequent dating

6. frequently express views to others

7. have considerable impact on the social groups to which they belong

8. meet people very readily and easily

9. desire a position with authority and responsibility in an occupation which allows a great deal of interaction with people

10. perceive themselves to be popular

11. religion is an important factor in their lives

(This information was a part of Dr. Gilbert's second class in his seminar at Gilbert Associates "Employee Attitudes and Values.")

Appendix H

Types of Higher Educational Institutions

TYPES OF HIGHER EDUCATIONAL INSTITUTIONS

I. Universities

For purposes of this discussion, universities are those public and private institutions which offer the doctoral degree in one or more fields. In today's market the PhD degree is virtually mandatory in order to be considered for a teaching position. New PhD's are normally hired at the Assistant Professor level, and may remain at that rank for no more than seven years before either being promoted or given a terminal contract. Promotion to Associate Professor under these conditions also conveys tenure. Evidence of scholarly achievement in the form of research and publication is normally a condition for promotion.

I. Colleges

Those public and private institutions which offer bachelor's and master's degrees, but do not grant the PhD. In today's market the PhD degree is almost a requirement. Presidents of several colleges have stated that there are plenty of qualified applicants for teaching positions, and many have PhD's. The various accrediting bodies like to see the colleges upgrading their programs, and increasing the percentage of PhD's on the faculty implies progress. Promotion to Associate Professor level can occur without publications, but they make it easier.

III. Community Colleges (Junior Colleges)

Mainly public institutions which provide two years' education beyond high school. These schools grant a two-year "certificate" in lieu of a degree. Since no graduate degrees are given, and no upper-level specialized courses, there is little pressure to conduct research and publish--these schools put more emphasis on the quality of teaching than colleges and universities. The PhD degree is not required, and in fact an individual's interest in, and aptitude for, teaching is often more important than the PhD (See accompanying article). The MS is desirable.

IV. Technical Institutes

Mainly public institutions which provide either two years' technical or vocational training beyond high school (granting a certificate in technology) or four years' training (granting a Bachelor of Technology), or both. Most of these institutions are not seeking persons with PhD's. They generally require a bachelor's degree and prefer a master's degree, but the teachers must have had appropriate industrial or trade experience in their field, often a minimum of three years. There is no pressure to conduct research or to publish. Currently these institutions are growing at a faster rate than any other segment of higher education. Also, enrollments in Engineering Technology are down, while enrollments in the Allied Health fields are up.

(The source of the data on the following pages is the Education Directory 1970-71)

INSTITUTIONS OF HIGHER LEARNING IN TEXAS

I. UNIVERSITIES

1. Baylor University
   Waco 6,471
2. Dallas Theological Seminary
   Dallas 446
3. East Texas State University
   Commerce 9,263
4. Lamar University
   Beaumont 10,811
5. North Texas State University
   Denton 16,501
6. Rice University
   Houston 3,156
7. Southern Methodist University
   Dallas 9,830
8. Southwestern Baptist Theological Seminary
   Ft. Worth 1,791
9. Texas A and M University
   College Station 14,034
10. Texas Christian University
    Ft. Worth 6,463
11. Texas Tech University
    Lubbock 19,490
12. Texas Woman's University
    Denton 5,318
13. University of Dallas
    Irving 1,202
14. University of Houston
    Houston 24,383
15. University of Texas
    Arlington 13,869
16. University of Texas
    Austin 37,107

II. COLLEGES

1. Abilene Christian College
   Abilene 3,110
2. Angelo State University
   San Angelo 3,482
3. Austin College
   Sherman 1,072
4. Austin Presbyterian Theological Seminary
   Austin 105
5. Bishop College
   Dallas 1,940
6. Dallas Baptist College
   Dallas 1,491
7. Dominican College
   Houston 440
8. East Texas Baptist College
   Marshall 762
9. Episcopal Theological Seminary of the Southwest
   Austin 54
10. Gulf Coast Bible College
    Houston 287
11. Hardin-Simmons University
    Abilene 1,723
12. Houston Baptist College
    Houston 1,089
13. Howard Payne College
    Brownwood 1,429
14. Huston-Tillotson College
    Austin 641

COLLEGES (con't)

15. Incarnate Word College
San Antonio 1,303

16. Jarvis Christian College
Hawkins 550

17. Letourneau College
Longview 740

18. Lubbock Christian College
Lubbock 720

19. Mary Hardin-Baylor College
Belton 789

20. McMurry College
Abilene 1,636

21. Midwestern University
Wichita Falls 4,008

22. Oblate College of the Southwest
San Antonio 36

23. Our Lady of the Lake College
San Antonio 1,664

24. Pan American College
Edinburg 4,612

25. Paul Quinn College
Waco 584

26. Saint Edward's University
Austin 850

27. Saint Mary's University
San Antonio 4,278

28. Sam Houston State University
Huntsville 8,601

29. South Texas College of Law
Houston 577

30. Southwestern Assembly of God College
Waxahachie 645

31. Southwestern Union College
Keene 428

32. Southwestern University
Georgetown 863

33. Southwest Texas State College
San Marcos 9,372

34. Stephen F. Austin State University
Nacogdoches 8,740

35. Sul Ross State University
Alpine 2,304

36. Texas A and I University
Kingsville 7,233

37. Prairie View A and M College
Prairie View 4,325

38. Tarleton State College
Stephenville 2,665

39. Texas College
Tyler 437

40. Texas Lutheran College
Seguin 821

41. Texas Southern University
Houston 4,754

42. Texas Wesleyan College
Fort Worth 1,900

43. Trinity University
San Antonio 2,641

44. University of Corpus Christi
Corpus Christi 616

45. University of Saint Thomas
Houston 1,136

46. University of Texas
El Paso 10,485

47. Wayland Baptist College
Plainview 692

48. West Texas State University
Canyon 7,935

49. Wiley College
Marshall 468

III. COMMUNITY COLLEGES

1. Alvin Junior College
   Alvin 1,257

2. Amarillo College
   Amarillo 3,450

3. Angelina College
   Lufkin 871

4. Bee County College
   Beeville 1,036

5. Blinn College
   Brenham 1,622

6. Brazosport Junior College
   Freeport 899

7. Central Texas College
   Killeen 2,422

8. Christian College of the Southwest
   Dallas 422

9. Cisco Junior College
   Cisco 1,038

10. Clarendon College
    Clarendon 338

11. College of the Mainland
    Texas City 927

12. Concordia Lutheran College
    Austin 197

13. Cooke County Junior College
    Gainesville 1,332

14. Eastfield College
    Mesquite No Data

15. El Centro College
    Dallas 7,751

16. Mountain View College
    Dallas No Data

17. Del Mar Col[illegible]
    Corpus Christi 4,361

18. Fort Worth Christian College
    Fort Worth 128

19. Frank Phillips College
    Borger 612

20. Galveston College
    Galveston 914

21. Grayson County Junior College
    Denison 2,538

22. Henderson County Junior College
    Athens 1,329

23. Hill Junior College
    Hillsboro 623

24. Howard County Junior College
    Big Spring 1,048

25. Jacksonville College
    Jacksonville 136

26. Kilgore College
    Kilgore 2,648

27. Laredo Junior College
    Laredo 1,577

28. Lee College
    Baytown 3,136

29. Lon Morris College
    Jacksonville 419

30. McClennan Community College
    Waco 2,126

31. Navarro Junior College
    Corsicana 1,131

32. Odessa College
    Odessa 3,209

33. Panola College
    Carthage 637

34. Paris Junior College
    Paris 761

35. Ranger Junior College
    Ranger 479

36. Saint Phillip's College
    San Antonio 1,849

37. San Antonio College
    San Antonio 13,648

COMMUNITY COLLEGES (con't)

38. San Jacinto College
Pasadena 6,743

39. Schreiner Institute
Kerrville 240

40. South Plains College
Levelland 1,637

41. South Texas Jr. College
Houston 4,936

42. Southwestern Christian College
Terrell 206

43. Southwest Texas Junior College
Uvalde 1,161

44. Tarrant County Junior College
(NE Campus)
Hurst 3,413

45. Tarrant County Junior College
(South Campus
Fort Worth 5,629

46. Temple Junior College
Temple 1,169

47. Texarkana College
Texarkana 1,913

48. Texas Southmost College
Brownsville 1,431

49. Tyler Junior College
Tyler 3,807

50. Victoria College
Victoria 1,586

51. Weatherford College
Weatherford 1,140

52. Wharton County Junior College
Wharton 1,992

IV. TECHNICAL INSTITUTES

1. Texas State Technical Institute (James Connally Campus)
Waco 1,152

2. Texas State Technical Institute (Rio Grande Campus)
Harlingen 76

There are a number of other two year colleges which have courses in technical and vocational education - for example, Amarillo College, Bee County College, Central Texas College, Cisco Junior College, College of the Mainland, Eastfield College, Mountain View College, Del Mar College, Henderson County Junior College, Lee College, etc.

This listing does not include medical schools, or schools of pharmacy, nursing, dentistry, veterinary medicine, etc.

REPRINTS FROM THE CHRONICLE OF HIGHER EDUCATION

In the original project report sent to the Moody Foundation, Appendix H also contained reprints of the following articles from The Chronicle of Higher Education, 1717 Massachusetts Avenue, N.W., Washington, D.C.

Many 2-year colleges resist hiring Ph.D.'s; doubt their teaching skill. January 24, 1972, pp. 1; 4.

Junior Colleges and the Ph.D.'s: 2 views. Letters to the editor from A. H. Muller and E. V. Shields. February 14, 1972, p. 6.

Appendix I

Faculty Unions; Tenure

REPRINTS FROM THE CHRONICLE OF HIGHER EDUCATION AND FROM U.S. NEWS & WORLD REPORT

In the original project report sent to the Moody Foundation, Appendix I contained reprints of the following articles:

From The Chronicle of Higher Education:

Faculty association and union face run-off in SUNY bargaining election; AAUP out. January 11, 1971, p. 4.

AAUP asks labor relations board for rules of collective bargaining by professors. July 5, 1971, p. 6.

NEA college group told it 'cannot live by bargaining alone.' July 5, 1971, p. 10.

28 ballots are challenged in Fordham bargaining vote. November 22, 1971, p. 5.

AAUP commits to bargaining for first time. November 22, 1971, p. 1.

Strong sentiment favors change in academe. March 20, 1972, p. 7.

Chicago city teachers strike. January 11, 1971, p. 12.

Ashland College drops 43 teachers. March 20, 1972, p. 3.

Bargaining run-off at Wayne State. March 27, 1972, p. 3.

Bargaining bid. April 10, 1972, p. 4.

Colleges and universities where faculties have chosen collective bargaining agents [table]. May 15, 1972, p. 2.

AAUP votes overwhelmingly to pursue bargaining; some see sacrifice of association's character. May 15, 1972, pp. 1, 2

Moog, Florence, The alternative to Tenure. April 10, 1972, p. 8.

From U.S. News & World Report:

Are lifetime jobs for professors in jeopardy? December 11, 1972, pp. 55-57.

Appendix J

Student Evaluation Form

CHEMICAL ENGINEERING 384.51

College Teaching in Engineering and Science

Course Evaluation

1. Listed below are some of the major aspects of this course. Please react to them in terms of their value to you, and give any suggestions you have for making them more useful.

   a. microteaching experiences –

   b. classroom teaching experience –

   c. videotape feedback sessions –

   d. class discussions –

   e. media course –

   f. textbook: COLLEGE TEACHING: A SYSTEMATIC APPROACH –

   g. textbook: LEARNING: REINFORCEMENT THEORY –

h. films about learning –

i. seminar presentations by class members –

2. Were the requirements of this course clear to you? If not, what could have been done to make them clearer?

3. Did you feel that this course made unreasonable demands on you time?

4. What is your opinion of the contract system of grading used in this course? Do you have any suggestions for an alternative grading system which would be appropriate for a course such as this?

5. What is your evaluation of the sequence in which topics were considered? What changes, if any, would you suggest with regard to sequencing?

6. Are there content areas or topics which you think should be added to the course in the future? If so, what?

7. How would you describe the interpersonal atmosphere of the class?

8. Are there any activities (e.g., field experiences, tours, projects, etc.) which you think should be added to the course? If so, what?

9. At the present time, what aspect of teaching concerns you most?

10. How, if at all, has this course affected your perceptions of and attitude toward teaching?

11. What do you think would be an optimal size for a class of this type?

12. General comments, suggestions, criticism, reactions?

THANK YOU